

REMARKS

Present Status of the Application

The Office Action rejected claims 1-3. Specifically, the Office Action rejected claims 1-3 under 35 U.S.C. 112, first paragraph. The Office Action rejected claims 1-3 under 35 U.S.C. 102(e) as being anticipated by Saino (U. S. Patent 6,181,018). Applicants have amended claim 1 to overcome rejections under 35 U.S.C. 112, first paragraph. No new matter adds through the amendment. After entry of the amendment, claims 1-3 remain pending in the present application, and reconsideration of those claims is respectfully requested.

Discussion of Claim Rejections under 35 USC 112

As noted by the Office Action, usually, several layers are sequentially formed on a substrate. The alignment mark is formed on the substrate and could be damaged while forming those layers. The present invention provides the condition to form the alignment mark to effectively prevent it from being damaged. The phrase "plurality of layers" is deleted from claim 1.

Discussion of Claim Rejections under 35 USC 102

The Office Action rejected claims 1-3 under 35 U.S.C. 102(e) as being anticipated by Saino. Applicants respectfully traverse the rejections for at least the reasons set forth below.

With respect to claim 1, in order to effectively prevent the alignment mark from being damaged, the present invention configures the alignment marks by the parameters of recess width, spacing d , and the distance $(5d - 80d)$ to the trench. Claim 1 reads as follows:

Claim 1. An alignment mark configuration, which is applicable on a substrate, the alignment mark configuration comprising:

an alignment mark on the substrate, wherein the alignment mark comprises a plurality of recesses and a spacing between the neighboring recesses is "d", wherein the recess has a width of about 2 microns to about 6 microns and the spacing "d" is a range of about 6 microns to about 12 microns; and

a trench, wherein a spacing between the trench and the alignment mark is of a range between about 5d to about 80d.

Saino does not teach the above emphasized features of claim 1. More specifically, Saino does not teach an alignment mark on the substrate, which alignment mark comprises recesses. In stead, he teaches an alignment mark above the substrate. Throughout Saino's patent, he clearly teaches that the protruding portion of the oxide layer 13 or the step 16a is used as an alignment mark. Col. 4, lines 20-23, Col. 6, lines 29-30, and Figs. 1B and 3F. As shown in the Figs., the protruding portion of the oxide layer 13 protrudes from the upper surface of substrate 11 and, therefore, the alignment mark is located above the substrate, not on the substrate. In the present invention, the alignment mark comprises recesses which are formed in the substrate. In other words, these recesses are used as alignment mark. The Office Action asserted that the alignment mark region of Saino comprises recesses 11a. However, trench 11a is used to electrically isolate the circuit elements, not as an alignment mark. A thermal oxide layer 12 and a CVD oxide layer 13 are formed to fill the trench 11a. "A portion of the CVD oxide layer smoothly protrudes from a surface area of the semiconductor substrate and forms a step. The step is an alignment mark." (Abstract)

Saino also fails to teach that the recess has a width of about 2 microns to about 6 microns and the spacing "d" is a range of about 6 microns to about 12 microns as required by claim 1. Saino discloses that the width of the active regions and the element isolation regions is approximately from 0.1 to 100 micron. However, the width of the active region 1 and the element isolation region 2 is different from the width of the recess 11a which the Office

Action regards as equivalent of the alignment mark recesses of the present invention. And Saino is totally silent about the width of the recess 11a and the spacing "d" therebetween. As defined in claim 1, the spacing "d" is about 1 to 6 times of the width of the recesses. The recesses 11a clearly do not meet this requirement. It is noted that the active region 1 and the isolation area 2 are not well defined. By carefully reading the patent, it seems that the shaded areas represent active regions 1, while the blank areas represent element isolation areas 2 as shown in Fig. 1A. Therefore, the width of the active region and the element isolation region has nothing to do with the width of the recesses. They are independent from each other. For example, the width of the recess 11a could be smaller or larger than the width of the active region and the element isolation region. Therefore, the width of the active region and the element isolation region does not tell us anything about the width of an alignment mark recess.

Saino further fails to teach that **a spacing between the trench and the alignment mark is of a range between about 5d to about 80d** as required by claim 1. Saino never teaches or even remotely suggests that the trench must be at least 5d away from the alignment mark, but not more than 80d.

The present invention as a whole defines a special relationship between the width of the recesses, the spacing "d", and the distance between a trench and the alignment mark, and unexpected results are achieved with such alignment mark configuration. And the invention should be considered as a whole. Saino is totally silent about this relationship. As described in the specification, an alignment mark is usually formed concurrently with a trench isolation structure. Since the last step in trench formation is chemical-mechanical polishing, damage may be inflicted upon the alignment mark. To resolve this problem, the present invention provides the alignment mark configuration as recited in claim 1. Saino does not even realize

the problem facing the present invention. Indeed, in Saino, the alignment mark (i.e., the protruding portion of the oxide layer 13, or the step structure 13a) is formed after the trenches are formed and polished.

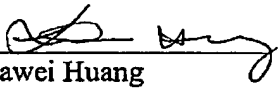
For at least the foregoing reasons, Applicants respectfully submit that independent claim 1 patently define over the prior art, and should be allowed. For at least the same reasons, dependent claims 2-3 patently define over the prior art as well.

CONCLUSION

For at least the foregoing reasons, it is believed that all the pending claims 1-3 of the invention patently define over the prior art and are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,

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